REMARKS

The Amendments to the Specification and Claims

With the entry of the above amendment, Claims 1 and 3-5 are pending in amended form, and 7-26 are newly-presented. Of the pending claims, Claims 1, 24, and 25 are independent claims, with Claims 3-5, 7-23, and 26 being the dependent claims.

Most of the amendments to the specification are merely to correct obvious typographical and grammatical errors. The addition of the sentence at Page 8 line 19 is to provide support for Claims 3 and 5, as originally filed. As to the amendments to the claims, Applicants have amended Claim 1 by incorporating both Claims 2 and 6 into Claim 1, i.e., reciting the film as a multilayer film which is also heat shrinkable. Accordingly, Applicants have cancelled Claims 2 and 6. Accordingly, as amended, all of the pending claims are now directed to multilayer film which is heat-shrinkable. Applicants note that the amendments to Claims 3, 4, and 5 are of a formal nature, i.e., to improve the readability of the claims by inserting commas at appropriate locations, and to clarify the claims by addressing an inadvertent lack of antecedent basis in Claim 3. Applicants contend that none of the amendments to the claims contains new matter.

As to newly-presented Claims 7-26, Applicants direct attention to the following table, which sets forth locations in the application as filed which support the recitations of each of the newly-presented claims.

Claim Number	Exemplary Support in Specification
7	Examples 1-4, 14-16, 29-37, 38-46, and 47-56

8	Table I and Table III
9	Table III
10	Page 8 lines 3-8
11	Page 10 lines 1-7
12, 13, and 14	Page 10 line 30 through Page 11 line 10
15	Example 1
16	Example 2
17	Example 3
18	Example 4
19	Examples 11-16
20	Page 9 lines 18-26
21 and 22	Table IV (Pages 20-21)
23	Page 18 lines 13-23 (Table III)
24	Page 9 lines 27-31
25	Page 9 lines 11-26
26	Page 9 lines 16-18

Applicants contend that no new matter is present in newly-presented Claims 7-26.

Substitute Specification

Paragraph 4 of the 3 October Office Action states that a substitute specification is required pursuant to 37 CFR 1.124(a) because the margins are not proper, and that the top lines on each page are now illegible because words have been obliterated by holes used to attach the specification to the file wrapper.

In response, Applicants provide herewith a substitute specification without any amendments, including the amendments set forth above. The substitute specification contains no additional subject matter not of record.

The Double Patenting Rejection

In the 12 May Office Action, Claims 1-6 are rejected under the doctrine of obviousness-type double patenting as being unpatentable over U.S. Patent No. 5,604,043 to Ahlgren. In response thereto, Applicants submit herewith a terminal disclaimer over U.S. Patent No. 5,604,043.

The Rejection of Claims 1-6 under 35 USC 112 Second Paragraph

In the 12 May Office Action, Claims 1-6 are rejected as indefinite in reciting the term "limited." The Office Action states that the term "limited" is not defined by the claim, and that the specification does not provide a standard for ascertaining the requisite degree, and that one of skill in the art would not be reasonably apprised of the scope of the invention, and that it is not clear what amount of long chain branching would be included or precluded by Applicants' claims.

In response, Applicants note that Claim 1 has been amended so that it no longer recites the long chain branching as being "limited." Accordingly, Applicants respectfully request that this rejection be withdrawn.

The Rejections of Claims 1-5 35 USC 102(e) as Anticipated by LAI et al '272 and LAI et al '236

In the 3 October Office Action, Claims 1, 3, 4, and 5 are rejected under 35 USC 102(e) as anticipated by U.S. Patent No. 5,278,272, to Lai et al ("LAI et al '272"), as well as U.S. Patent No. 5,272,236, also to Lai et al ("LAI et al '236"). The Examiner states that each of LAI et al '272 and '236 teaches ethylene-alpha-olefin polymers having long chain branching produced by single site cyclopentadienyl metal catalysts, and that these ethylene-alpha-olefin copolymers are produced into

blown films, and that LAI et al '272 further teaches that the polymers of their invention can be used to make films using conventional processing techniques and that blends of the polymers are also useful, and that examples in LAI et al '272 show polymers having densities of 0.87 g/cc. Similar statements are made regarding LAI et al '236.

In response to both §102(e) rejections, Applicants point out that due to the above amendment of Claim 1 to recite a multilayer film which is also heat-shrinkable (together with the simultaneous cancellation of Claims 2 and 6), both §102(e) rejections of Claims 1, 3, 4, and 5 are rendered moot, because neither LAI et al '272 nor LAI et al '236 discloses a multilayer, heat-shrinkable film comprising homogeneous single site catalyzed copolymer of ethylene and an alpha-olefin copolymer having from three to ten carbon atoms, wherein the single site catalyzed copolymer has long chain branching. Applicants further note that neither of the rejections under §102(e) included a rejection of Claim 6 (now canceled) as anticipated by LAI et al '272 or LAI et al '236. Thus, it appears that Claim 1 (Once Amended), as well as Claims 3-5, are novel over LAI et al '272 and LAI et al '236. Accordingly, Applicants contend that Claims 1, 3-5, and 7-35 are all novel over LAI et al '272 and LAI et al '236, and Applicants respectfully request withdrawal of the rejection of Claims 1 and 3-5 as anticipated by LAI et al '272 and LAI et al '236.

The §103 Rejection of Claims 1-6 as Obvious over MUELLER in view of LAI et al '236

In Paragraph 10 of the 3 October Office Action, Claims 1-6 are rejected under 35 USC 103, as obvious over U.S. Patent No. 4,532,189 to Mueller ("MUELLER"), in view of LAI et al '236. The office action states that MUELLER teaches heat shrinkable multi-layer films comprising

DOWLEX 2045 (i.e., "LLDPE"), and that LAI et al '236 teaches substantially linear polyethylene that has superior properties to conventional polyethylenes, in terms of gloss, haze, and clarity, and that LAI et al '236 further teaches that resins of their invention would be useful in films and useful in blends. The office action states that it would have been obvious to one having ordinary skill in the art at the time the invention was made to use substantially linear olefin polymers of the type taught by LAI et al in place of the LLDPE of the films taught by MUELLER, in order to produce a film having higher gloss, lower haze, and better clarity which could be more easily produced.

In response, Applicants contend that Claims 1 and 3-5, as amended, are nonobvious over MUELLER in view of LAI et al '236, for several reasons. First, Applicants note that while the film disclosed in MUELLER is a heat shrinkable film, the films disclosed in LAI et al '236 are blown films.[1] The blown film disclosed in LAI et al '236 would not inherently perform as nor be recognized as a heat-shrinkable film within the scope of Applicants' claims, as they are made by a simple bubble process in which orientation is carried out immediately upon extrusion, i.e., while the polymer remains molten or at a temperature which is near molten. In contrast, orientation to produce the heat-shrinkable film of the invention involves first casting a primary film, then orienting the thick primary film well below the melting point of the resins, and thereby producing biaxial heat-shrinkability which is much greater than any substantially mono-axial heat-shrinkability exhibited by blown films in similar packaging operations. Moreover, those of skill in the art recognize heat-shrinkable films as those films which exhibit high percentage free shrink in

[1] Paragraph 11 of the Office Action states: "Lai et al (5,272,236) or (5,278,272) teach blown films as discussed above. While each Lai et al. patent teach blown films, they do not specifically teach the production of blown shrinkable films."

both the machine and transverse directions at temperatures substantially lower than any temperature at which a blown film may undergo any shrinkage. Still further, without annealing, a heat-shrinkable film has a shrink tension several orders of magnitude higher than any shrink tension which may be generated by any shrinkage which may occur with a blown film. Those of skill in the art recognize the very substantial difference in heat shrink characteristics between blown films and heat-shrinkable films. As alluded to above, one of the characteristic differences is a virtual lack of shrinkage in the transverse direction with a blown film.

Until Applicants' invention, there was a substantial element of chemical unpredictability in whether a long chain branched homogeneous ethylene/alpha-olefin copolymer could have been oriented by the process MUELLER discloses for the preparation of heat shrinkable films. The process disclosed by MUELLER is the extrusion of a thick-walled "tape" which is thereafter heated to its softening point and oriented via a trapped bubble. See MUELLER at Column 7 line 27 through Column 8 line 23. Some polymers have been found to possess enough melt strength for the production of heat shrinkable films by the downward casting of a tape, while others have not had the requisite melt strength. Exxon's linear metallocene catalyzed linear ethylene/alpha-olefin copolymers (i.e., the EXACT copolymers) have been found to lack the melt strength required to undergo the downward casting step of process used in MUELLER to make heat-shrinkable films. Thus, information regarding the use of a resin to make a blown film as well as any properties from the blown film will not assist one in a determination of the resin's potential when making a heat shrinkable film. Whether long chain branched homogeneous ethylene/alpha-olefin copolymers even have the requisite melt strength to produce the oriented films by the process of Mueller is

chemically unpredictable. Additionally, one could not rely on any such blown film information to estimate whether a film, if made, would have beneficial properties. At most, it would be merely "obvious to try" or "obvious to experiment." However, obvious to try or obvious to experiment is not obvious under the law.[2]

Applicants have discovered through experimental work that which was unpredictable: that homogeneous long chain branched ethylene/alpha-olefins can be used to make multilayer heat shrinkable films using trapped bubble and tenter frame processes. In addition, Applicants have discovered that such heat shrinkable films show unexpected improvements in shrink and impact energy. More particularly, turning to Table 1 on Page 16 of Applicants' specification, Example 6 is a test of the film of Example 1, while Example 10 is a test of the film of comparative Example 5. The film of Example 1 is identical to the film of Example 5, except that the film of Example 1 contained 85% homogeneous copolymer having long chain branching in the outermost layer of the precursor film, whereas the film of comparative Example 5 contained 85% Dowlex™ 2045 linear low density polyethylene in the outermost layer of the precursor film. This is the same polymer as disclosed in MUELLER, i.e., the polymer referred to in the office action. As can be seen by comparing the results of the film of Example 1 with the film of comparative Example 5, the film of Example 1 exhibited significant higher free shrink (73% versus 49.9%), as well as higher impact energy (2.35 ft-lbs versus 2.20 ft-lbs). This comparison of the film of Example 1 with the film of comparative Example 5 is a comparison which goes directly to whether Claims 1 and 3-5 are obvious over MUELLER in view of LAI et al '236, because the evidence shows that Applicants

[2] *In re O'Farrell*, 853 F.2d 894, 7 USPQ2d 1673 (Fed. Cir. 1988); *Amgen, Inc. v. Chugai Pharmaceutical Co.*, 927

discovered that substituting the copolymer of LAI et al '236 for the Dowlex™ 2045 resin of MUELLER produced unexpected results in the area of free shrink and impact energy. Moreover, Applicants' claims 8, 9, and 23 recite impact energy and free shrink in accordance with the unexpected improvement in impact energy and free shrink argued above.

As can be seen from the contents of Table 1, Applicants have discovered that the substitution of the polymer of LAI et al '236 provides unexpected advantages over the film of MUELLER, i.e., higher instrumented impact energy than the film of comparative Example 5. This evidence of unexpected results is not mere argument; rather, it is evidence which Applicants have sworn to in their executed Declaration which accompanied the filing of their application. As such, this evidence need not be provided in the form of a declaration under 37 CFR §132. Moreover, this evidence was not generated in response to the rejection of the claims; rather, it has been disclosed in Applicants' specification since November 30, 1992.

Although the Office Action suggests modifying MUELLER with the polymer of LAI et al '236 for the purpose of improving the gloss, haze, and clarity, i.e., optical properties, the improvements Applicants have discovered are of a different nature. The impact energy and the free shrink at low temperature (e.g., at 185°F and 195°F) are important properties, especially for the packaging of foods. In the packaging of fresh meat products, it is advantageous for the film to have a relatively high free shrink at a relatively low temperature, so that the film can be heated and thereby shrunk tight against the meat product, without any adverse effect upon the food product while heat shrinking the film.

F.2d 1200, 18 USPQ2d 1016 (Fed. Cir. 1991)
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Further evidence of unexpected results is set forth in Table III. A comparison of films produced with equal irradiation, i.e., Examples 11, 14, and 17 each irradiated at 2 megarads, shows that the films of Applicants' invention (Examples 11 and 14, containing homogeneous copolymer having long chain branching) exhibited higher peak instrumented impact strength (59.6 pounds and 63.0 pounds, respectively) than the heterogeneous Attane™ 4203 very low density polyethylene resin of Example 17 (52.8 pounds). Moreover, the films of Examples 11 and 14 exhibited higher impact energy (3.45 ft-lbs and 3.36 ft-lbs) than the LLDPE based film of Example 17 (2.83 ft-lbs). These are further evidence of unexpected results over films containing heterogeneous resin, such as the LLDPE resin of MUELLER. Again, this result is not taught or suggested in LAI et al '236, and is unexpected over LAI et al '236. Additional unexpected impact results can be gleaned from comparing the Table III results of the films of Examples 12 and 15 (impact energy of 3.08 and 2.96 ft-lbs, respectively) with the film of comparative Example 18 (impact energy of 2.87 ft-lbs), all of which were irradiated at 4 megarads. Still further unexpected results can be seen in Table III by comparing Examples 13 and 16 (impact energy of 3.17 and 3.39 ft-lbs, respectively) with the film of comparative Example 19 (impact energy of 3.01 ft-lbs), all of which were irradiated at 6 megarads. These unexpected results support the patentability of all pending claims reciting irradiation, i.e., Claims 12, 13, and 14.

Still further evidence of unexpected results for Applicants' newly-presented process claim 25, as well as article claims 12-14, can be gleaned from an examination of Table II, on Pages 17-18 of Applicants' specification. Table II provides evidence in Examples 11-16 that various multilayer

films made according to Applicants' claimed process, utilizing homogeneous ethylene alpha-olefin copolymer having long chain branching, provide *a increasing orientation speed as the amount of irradiation dosage increases,* relative to corresponding comparative multilayer films set forth Comparative Examples 17-19, which contained a heterogeneous ethylene octene copolymer of approximately the same density as the homogeneous ethylene alpha-olefin copolymer having long chian branching present in the films of Examples 11-16, i.e., 0.904 g/cc for the homogeneous resin and 0.905 g/cc for the heterogeneous resin. More particularly, note that for the films of Examples 11-13 the orientation speed increased from 46 to 53 feet per minute as the irradiation was increased from 2 to 4 MR; for the film of Examples 14-16, the orientation speed increased from 40 to 46 to 51 feet per minute as the irradiation dosage was increased from 2 to 4 to 6 MR. In contrast, for the film of comparative Examples 17-19, the orientation speed remained constant at 46 feet per minute as the irradiation dosage was increased from 2 to 4 to 6 feet per minute. Thus, the application as filed demonstrates yet another unexpected result: irradiated, oriented films in accordance with the invention (i.e., the film claimed in Applicants' Claims 12-14) can be made at increasing orientation speed as the amount of irradiation increases from 2 megarads to 6 megarads, using the process as recited in Applicants' Claim 34. This is further evidence in support of the patentability of Claims 12-14 and 34, because prior to Applicant's invention, one of skill in the art would not have known whether these homogeneous resin having long chain branching could be made into heat shrinkable films, especially in view of the contemporaneous disclosure of processing difficulties of single site resins. Accordingly, Applicants contend that the subject matter of Claims 1 and 2-5 (as amended hereinabove), as well as the subject matter of newly-presented Claims 7-26, have been

shown to provide unexpected results, and Applicants respectfully request withdrawal of the rejection of Claims 1 and 3-5 as obvious over MUELLER in view of LAI et al '236.

In summary of the unexpected results, Applicants note that their claimed film exhibits (1) an unexpected increase in free shrink, and (2) an unexpected increase in impact energy and peak instrumented impact strength; and (3) that their claimed film can be oriented at increased orientation speeds with increasing degrees of irradiation. Applicants contend that their specification is clear in disclosing unexpected results over films such as the film disclosed in MUELLER. Applicants' discovery of higher free shrink, higher impact energy (and higher instrumented impact strength), and higher orientation speed as radiation dosage increases, does not follow from the disclosure of blown film in LAI et al '236 of improved optical properties such as haze and clarity. Thus, even if a prima facie case of obviousness has been made out, Applicants have demonstrated, from the November 30, 1992 filing date of their application, that their claimed film exhibits unexpected results, and Applicants are entitled to a patent for their invention. Accordingly, Applicants respectfully request withdrawal of the rejection of Claims 1 and 3-5, and favorable consideration of newly-presented Claims 7-26.

The §103 Rejection of Claims 2 and 3 as Obvious over LAI et al '236 or LAI et al '272 in view of BAIRD et al.

In the 3 October Office Action, Claims 2 and 3 are rejected under 35 USC 103, as obvious over LAI et al '236 or LAI et al '272 in view of U.S. Patent No. 3,022,543, to Baird Jr. et al. ("BAIRD Jr. et al). The office action states that LAI et al '236 and LAI et al '272 teach blown films but do not teach blown heat shrinkable films, but that BAIRD Jr. et al teaches methods of producing shrinkable polyethylene films from a blown bubble. Paragraph 11 of the office action

concludes with the statement that it would have been obvious to one having ordinary skill in the art at the time the invention was made to have used the orientation methods taught by BAIRD Jr. et al to orient the ethylene/alpha-olefin films taught by LAI et al so as to produce shrinkable polyethylene films useful in packaging applications.

In response, Applicants contend that Claims 2 and 3 are patentable over LAI et al '236 and LAI et al '272 in view of BAIRD Jr. et al. Applicants contend that the office action does not make out a prima facie case of obviousness of either of claims 2 and 3, and moreover that Applicants have provided evidence of unexpected results over LAI et al '236 and LAI et al '272 in view of BAIRD Jr. et al.

At the outset, although the office action does not refer to any specific location of BAIRD Jr et al, it appears that the office action is referring to Figure 2 of BAIRD Jr. et al and the accompanying description thereof. That is, Figure 2 of BAIRD Jr et al discloses a process in which a blown film is produced via the upward extrusion of blown bubble 52, with the resulting tubular film being irradiated, heated in hot water, and thereafter oriented in the solid state via trapped bubble 38, to produce a film the office action refers to as a "blown shrinkable film."

Although the office action concludes that it would have been obvious to use the orientation methods taught by BAIRD Jr et al in the further processing of the blown films of LAI et al '236 and '272, the office action does not provide any statement as to "why" it would have been obvious to modify the blown films of LAI et al '236 and '272 so that they would be provided with heat-shrinkable character. Without such an explanation, the office action does not set forth any motivation necessary to establish a prima facie case of obviousness with such a combination of

references. It appears that the only motivation would be some hindsight reconstruction based on Applicants' specification. Applicants point out that there is no teaching or suggestion in LAI et al '236 or '272 that it would be beneficial to provide the blown film with heat-shrinkability.

Moreover, although LAI et al '272 refers to using the polymer to make film, LAI et al '272 does not have an example of the making of a film. However, Examples 10 and 12 of LAI et al '236 disclose one blown film, and it has a disclosed thickness 1 mil. See Column 21 line 3 of LAI et al '236. If this 1 mil thick blown film *were* converted to a heat shrinkable film using a trapped bubble by the tandem process of Figure 2 of BAIRD Jr. et al, such a film would have a final thickness of from about 0.04 to 0.11 mil, assuming a typical 3 x 3 to a 5 x 5 orientation, i.e., an orientation in accordance with Column 8 lines 4-8 of BAIRD Jr et al.. Applicants contend that this film would be much too thin to be useful as, for example, a heat-shrinkable bag for the packaging of meat. Moreover, such a thin film would not have an impact energy high enough to meet the shrink energy recited in Applicants' claims 8 and 9.

In addition to the above, Applicants refer to the various unexpected results provided above in response to the §103 rejection based on MUELLER in view of LAI et al '236. That is, Applicants' specification demonstrates that their claimed films exhibited higher shrink energy and higher impact strength than was obtained for both DOWLEX® 2045 (i.e., LLDPE) as well as ATTANE® 4203 (i.e., VLDPE). In BAIRD Jr. et al., the preferred polymer for use in the films is low-density polyethylene ("LDPE"). See Column 4 lines 46-48 of BAIRD Jr. et al. This resin provided advantages above "conventional" high density polyethylene. Those of skill in the art recognize that the impact performance of LDPE is less than the impact performance of either

recognize that the impact performance of LDPE is less than the impact performance of either LLDPE or VLDPE. Thus, the unexpected results demonstrated with respect to the much more recent LLDPE and VLDPE technology of MUELLER clearly also establishes unexpected results over BAIRD Thus, as Applicants have demonstrated unexpected results over MUELLER in view of LAI et al '236, such unexpected results also demonstrate the patentability of Applicants' claimed film over LAI et al '236 or '272 in view of BAIRD Jr et al.

CONCLUSION

In view of all of the foregoing arguments, it is respectfully submitted that Claims 1, 3-5, and 7-26 are patentable over the prior art, and in condition for allowance. Withdrawal of the rejection set forth in the 3 October 2000 Office Action is respectfully requested, with a view towards allowance.

If the Examiner has any questions or otherwise needs to discuss any matters related to this application, the Examiner is invited to call the undersigned at the telephone number provided below.

Respectfully submitted,

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Substitute Specification

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